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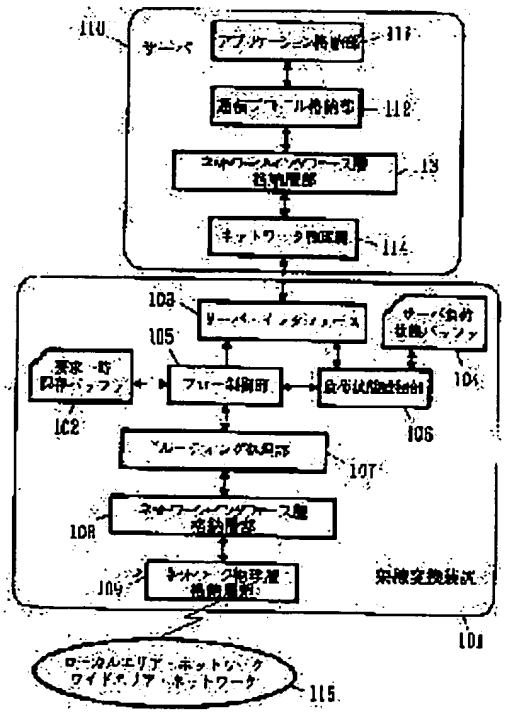
(54) NETWORK SYSTEM AND ITS LOAD CONTROL METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To process a large number of requests which are simultaneously received from plural client devices by storing temporarily the requests sent to a server from the client devices and controlling the number of requests to be sent to the server in response to the load state of the server.

SOLUTION: A line concentration conversion device 101 is placed between plural client devices and a server 110 to connect the local area networks or wide area networks to each other. The server 110 accepts the requests from the client devices in a network and performs the services and sends these service results back to the client devices. Then the device 101 temporarily stores the requests given to the server 110 from the client devices in a request temporary storing buffer 102. Meanwhile, a load state monitoring part 106 periodically monitors the load state of the server 110, and a flow control part 105 controls the number of request packets to be sent to the server 110 in response to the monitored load state of the server 110.



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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The network system which has the line concentration inverter which intervenes between the network, two or more client equipments on a network and the server that gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to the aforementioned client equipment characterized by providing the following, and the aforementioned client equipment and the aforementioned server The aforementioned line concentration inverter is a preservation buffer temporarily [demand] save temporarily the demand to the aforementioned server from the aforementioned client equipment. The loaded-condition Monitoring Department which supervises the loaded condition of the aforementioned server periodically The flow control section which adjusts the amount of drawing to the aforementioned server of the packet of the aforementioned demand according to the loaded condition supervised at the aforementioned loaded-condition Monitoring Department
[Claim 2] The aforementioned flow control section is a network system according to claim 1 characterized by choosing a server with the smallest load and taking out the packet of the aforementioned demand to the server by which selection was carried out [aforementioned] when two or more aforementioned servers exist.
[Claim 3] Network Two or more client equipments on a network The server which gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to the aforementioned client equipment The line concentration inverter which intervenes between the aforementioned client equipment and the aforementioned server The secondary storage connected to the aforementioned line concentration inverter It is the network system equipped with the above, and by making into a cache the result returned to the 1st time from the aforementioned server to the aforementioned client equipment, when the aforementioned line concentration inverter is made to memorize in the aforementioned secondary storage and there is the same demand from the aforementioned client equipment, it is characterized by having the flow control section which returns the content of the aforementioned cache to the aforementioned client equipment.
[Claim 4] The load adjustment method of a network system of having the line concentration inverter which intervenes between the network, two or more client equipments on a network and the server that gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to the aforementioned client equipment characterized by providing the following, and the aforementioned client equipment and the aforementioned server It is a preservation step temporarily [demand] which makes the demand to the aforementioned server from the aforementioned client equipment save temporarily. The loaded-condition surveillance step which makes the loaded condition of the aforementioned server supervise periodically The adjustment step which adjusts the amount of drawing to the aforementioned server of the packet of the aforementioned demand according to the loaded condition which carried out [aforementioned] surveillance
[Claim 5] The load adjustment method of the network system according to claim 4 characterized by choosing a server with the smallest load and taking out the packet of the aforementioned demand to the

server by which selection was carried out [aforementioned] in the aforementioned adjustment step when two or more aforementioned servers exist.
[Claim 6] The load adjustment method of a network system of having the line-concentration inverter which intervenes between the network, two or more client equipments on a network and the server that gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to the aforementioned client equipment characterized by to provide the following, and the aforementioned client equipment and the aforementioned server, and the secondary storage which were connected to the aforementioned line-concentration inverter The storage step made to memorize in the aforementioned secondary storage by making into a cache the result returned to the 1st time from the aforementioned server to the aforementioned client equipment The return step which returns the content of the aforementioned cache to the aforementioned client equipment when there is the same demand from the aforementioned client equipment

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[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the network system which consists of networks, such as a line concentration inverter, a server, client equipment, and a local area network, etc., and the load adjustment method of the network system.
[0002]
[Description of the Prior Art] In recent years, in the network system which consists of networks, such as a line concentration inverter, a server, client equipment (equipment of a client side), a local area network, and a Wide Area Network, etc., a lot of demand arrives from the arbitrary client equipments in the world increasingly at once with the explosive spread of the Internet to what is called the server which offers specific service, especially Internet server.
[0003] The art of the server to the demand from the client equipment in the network system which consisted of conventional client equipment, servers, and line concentration inverters below, and the role of the above-mentioned line concentration inverter are explained. When the demand from client equipment arrived, the server performed processing according to the demand and had returned the result to client equipment. Usually, when the demand from client equipment came simultaneously and the server was to a certain amount of number (usually five), by buffering with the little buffer which exists in the server itself, it was able to be taken and spilt and was able to be processed that there is nothing. At this time, the line concentration inverter could not but be the inverter which changes the line concentrator of a mere circuit, and the connected protocol of the network of ends, or equipment which controls the path of data which comes and goes.
[0004]
[Problem(s) to be Solved by the Invention] However, when six or more demands from client equipment came by the above-mentioned conventional network system simultaneously, the server had the trouble that any one demand had to be thrown away at least. Moreover, while performing processing whose server applies a very heavy burden to CPU or memory, when a demand came from client equipment, the result which receives the demand could not be easily returned to client equipment, but it had the trouble of becoming a time-out and throwing away after all.
[0005] By this network system and the load adjustment method, even if there is a lot of demand from client equipment, it is required that a demand should not be thrown away.
[0006] this invention aims at offering the load adjustment method for processing, when there is a lot of [simultaneous and] demand from the network system which can be processed even if there is a lot of [simultaneous and] demand from client equipment, and client equipment.
[0007]
[Means for Solving the Problem] In order to solve this technical problem the network system of this invention A network, two or more client equipments on a network, and the server that gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client

equipment and a server. a line concentration inverter Temporarily [demand] save the demand to the server from client equipment temporarily A preservation buffer, It has the composition which has the loaded-condition Monitoring Department which supervises the loaded condition of a server periodically, and the flow control section which adjusts the amount of drawing to the server of the packet of a demand according to the loaded condition which supervised at the loaded-condition Monitoring Department.
[0008] The network system which can be processed even if there is a lot of [simultaneous and] demand from client equipment by this is obtained.
[0009] The load adjustment method of this invention for solving this technical problem A network, two or more client equipments on a network, and the server that gives its service by receiving the demand from client equipment on a network, and returns the result to the aforementioned client equipment, Temporarily [demand] which it is [temporarily] the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and makes the demand to the server from client equipment save temporarily A preservation step, It has the composition which has the loaded-condition surveillance step which makes the loaded condition of a server supervise periodically, and the adjustment step which adjusts the amount of drawing to the server of the packet of a demand according to the supervised loaded condition.
[0010] The load adjustment method for processing, when there is a lot of [simultaneous and] demand from client equipment by this is acquired.
[0011]
[Embodiments of the Invention] The client equipment of the plurality [invention / according to claim 1 / of this invention] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client equipment and a server. a line concentration inverter Temporarily [demand] save the demand to the server from client equipment temporarily A preservation buffer, It is supposed that it has the loaded-condition Monitoring Department which supervises the loaded condition of a server periodically, and the flow control section which adjusts the amount of drawing to the server of the packet of a demand according to the loaded condition which supervised at the loaded-condition Monitoring Department. The demand to the server from client equipment is saved temporarily, and has operation that the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition.
[0012] In invention according to claim 1, the flow control section presupposes that invention according to claim 2 is taken out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen when two or more servers exist, and it has operation that a server with the smallest load is chosen among two or more sets of servers.
[0013] The client equipment of the plurality [invention / according to claim 3] on a network and a network, The server which gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client equipment and a server, and the secondary storage connected to the line concentration inverter. a line concentration inverter It is made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment. It is supposed that it has the flow control section which returns the content of a cache to client equipment when there is the same demand from client equipment. If the demand from client equipment is the same demand as last time, the storage capacity of a secondary storage has operation that do not increase and the traffic on a network does not increase.
[0014] The client equipment of the plurality [invention / according to claim 4] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to the aforementioned client equipment, Temporarily [demand] which it is [temporarily] the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and makes the demand to the server from client equipment save temporarily A preservation step, It is supposed that it has the loaded-

condition surveillance step which makes the loaded condition of a server supervise periodically, and the adjustment step which adjusts the amount of drawing to the server of the packet of a demand according to the supervised loaded condition. The demand to the server from client equipment is saved temporarily, and has operation that the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition.

[0015] In invention according to claim 4, in an adjustment step, when two or more servers exist, invention according to claim 5 decides to take out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen, and has operation that a server with the smallest load is chosen among two or more sets of servers.

[0016] The client equipment of the plurality [invention / according to claim 6] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and the secondary storage connected to the line concentration inverter. The storage step made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment, It is supposed that it has the return step which returns the content of a cache to client equipment when there is the same demand from client equipment. If the demand from client equipment is the same demand as last time, the storage capacity of a secondary storage has operation that do not increase and the traffic on a network does not increase.

[0017] Hereafter, the gestalt of operation of this invention is explained using drawing 1 - drawing 9 . (Gestalt 1 of operation) Drawing 1 is the block diagram showing the line concentration inverter and server which constitute the network system by the gestalt 1 of operation of this invention. The line concentration inverter to which 101 connects local area networks or Wide Area Networks in drawing 1 , 102 temporarily [demand] for the line concentration inverter 101 saving temporarily the demand to the server (it mentioning later) 110 from client equipment A preservation buffer, The server interface section required in order that, as for 103, the loaded-condition Monitoring Department (it mentions later) 106 in the line concentration inverter 101 may investigate the loaded condition of a server 110, The server loaded-condition buffer with which 104 memorizes the loaded condition of a server 110, The flow control section which 105 adjusts the amount required to a server 110, and performs a flow control, The loaded-condition Monitoring Department where 106 supervises the state of the load of a server 110, the routing processing section in which 107 manages routing of a packet, The network interface layer storing section which stores the network interface layer in which agency of the routing processing section 107 and a physical interface is performed 108, The network physical layer storing section which stores the network physical layer in which 109 manages the electrical property of a network, The server which exists on the network as the line concentration inverter 101 where 110 is the same, The application storing section which stores the application with which 111 offers specific service to client equipment, The communications protocol storing section for which 112 depended on the above-mentioned application, the network interface layer storing section which stores the network interface layer in which 113 performs agency of the above-mentioned communications protocol and a physical interface, The network physical layer in which 114 manages the electrical property of a network, and 115 are Wide Area Networks, such as a local area network or the Internet, such as an enterprise network, and an ISDN network.

[0018] Drawing 2 is the network-configuration view showing the network system by the gestalt 1 of operation of this invention. They are the Internet and client equipment by which the line concentration inverter by which 201 is equivalent to the line concentration inverter 101 of drawing 1 , the server of the name WWW with which 202 is equivalent to the server 110 of drawing 1 , and 203 are connected to 204 in drawing 2 , and 205 are connected to the Internet 203.

[0019] Drawing 3 is the data view showing the content of the preservation buffer 102 (refer to drawing 1) temporarily [demand] exists in the line concentration inverter 201. As for 301 and 304, in drawing 3 , the demand from client equipment 204, and 302, 303 and 305 are the demands from client equipment 205.

[0020] Drawing 4 (a) and (b) are the loaded-condition views showing the state of the server loaded-condition buffer 104 (refer to drawing 1) in a certain time, drawing 4 (a) shows the state of the server loaded-condition buffer 104 in Time T, and drawing 4 (b) shows the state of the server loaded-condition buffer 104 in time T+t. As for 401 and 403, in drawing 4 , a server name, and 402 and 404 are load values.
[0021] The operation is explained about the network system constituted as mentioned above.
[0022] First, client equipment 204 carries out [having required from the server 202, and]. The line concentration inverter 201 receives the packet of the above-mentioned demand in order of the network physical layer of the network physical layer storing section 109, the network interface layer of the network interface layer storing section 108, and the routing processing section 107, passes it to the flow control section 105, and is saved at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Next, client equipment 205 carries out [having required from the server 202, and]. The line concentration inverter 201 saves a demand similarly at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Again, a client 204 carries out [having required from the server 202, and]. The line concentration inverter 201 saves the above-mentioned demand at the preservation buffer 102 temporarily [demand] (demand one time preservation step).
[0023] When the above mentioned is repeated, the demands 301-305 as shown in drawing 3 will be memorized in an order from a top in the preservation buffer 102 temporarily [demand]. The line concentration inverter 201 supervises the loaded condition of a server 202 periodically by the server interface section 103 at the loaded-condition Monitoring Department 106, performing the above operation (loaded-condition surveillance step). The loaded-condition Monitoring Department 106 which acquired the loaded condition of a server 202 memorizes the value of a load to the server loaded-condition buffer 104. The format of the server loaded-condition buffer 104 expresses the server name 401 and the load value 402 of the server, as shown in drawing 4 (a), and the load value 402 of a server is expressed considering 100 as maximum.
[0024] The flow control section 105 looks at the load value 402 of a server, and, in the case of the value more than a certain constant value (for example, 70), the speed which takes out the packet of a demand from the preservation buffer 102 temporarily [demand] is loosened (adjustment step). At the time T of drawing 4 (a), since a load value is 34, it judges with the flow control section 105 having a margin in a server 202, as many packets as possible are taken out from the preservation buffer 102 temporarily [demand], and it sends to a server 202 (adjustment step). The state time t Where it has passed from this state is shown in drawing 4 (b). In the state which shows in drawing 4 (b), the load value is increasing to 89. It judges with the flow control section 105 not having CPU or memory which fully manages processing in a server 202, the speed which takes out a packet from the preservation buffer 102 temporarily [demand] is loosened (adjustment step), and it waits for the load value of a server 202 to fall again.
[0025] A server 202 the packet of the sent demand The network physical layer of the network physical layer storing section 114, The network interface layer of the network interface layer storing section 113, It processes in order of the communications protocol of the communications protocol storing section 112, and the application of the application storing section 111. Turn contrary to the above, i.e., application of the application storing section 111, A packet is sent in order of the communications protocol of the communications protocol storing section 112, the network interface layer of the network interface layer storing section 113, and the network physical layer of the network physical layer storing section 114, and a result is returned to the line concentration inverter 201.
[0026] The line concentration inverter 201 which received the result sends a result to client equipment 204 or 205.
[0027] According to the gestalt of this operation, as mentioned above by saving temporarily the demand to the server from the client equipments 204 and 205, and having adjusted the amount of drawing to the server of the packet of a demand according to loaded condition Since a server 202 can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, it becomes possible to return the result which

receives all demands to the client equipments 204 and 205.
[0028] (Gestalt 2 of operation) Drawing 5 is the network-configuration view showing the network system by the gestalt 2 of operation of this invention. They are the Internet and client equipment by which the line concentration inverter by which 501 is equivalent to the line concentration inverter 101 of drawing 1 , and 502 and 506 are connected to the same network as the line concentration inverter 501 in drawing 5 , the server of the names www1 and www2 equivalent to the server 110 of drawing 1 and 503 are connected to 504, and 505 are connected to the Internet 503.
[0029] Drawing 6 is the data view showing the content of the preservation buffer 102 (refer to drawing 1) temporarily [demand] exists in the line concentration inverter 501. As for 601 and 604, in drawing 6 , the demand from client equipment 504, and 602, 603 and 605 are the demands from client equipment 505.
[0030] Drawing 7 (a) and (b) are the loaded-condition views showing the state of the server loaded-condition buffer 104 (refer to drawing 1) in a certain time, drawing 7 (a) shows the state of the server loaded-condition buffer 104 in Time T, and drawing 7 (b) shows the state of the server loaded-condition buffer 104 in time T+t. As for 701, 703, 705, and 707, in drawing 7 , a server name, and 702, 704, 706 and 708 are burdens.
[0031] The operation is explained about the network system constituted as mentioned above.
[0032] First, client equipment 504 carries out [having required from the server, and]. In this case, client equipment 504 does not specify which server of servers 502 and 506 (names www1 and www2) it is. Two servers 505 and 506 are because the same service is offered. The line concentration inverter 501 saves the packet of the above-mentioned demand through the flow control section 105 like the gestalt 1 of operation at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Next, client equipment 505 carries out [having required from the server, and]. The line concentration inverter 501 saves a demand similarly at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Again, a client 504 carries out [having required from the server 202, and]. The line concentration inverter 501 saves the above-mentioned demand at the preservation buffer 102 temporarily [demand] (demand one time preservation step).
[0033] When the above mentioned is repeated, the demands 601-605 as shown in drawing 6 will be memorized in an order from a top in the preservation buffer 102 temporarily [demand]. The line concentration inverter 501 supervises periodically the loaded condition of two servers 505 and 506 (names www1 and www2) by the server interface section 103 at the loaded-condition Monitoring Department 106, performing the above operation (loaded-condition surveillance step).
[0034] The loaded-condition Monitoring Department 106 which acquired the loaded condition of a server 502 memorizes the value of a load to the server loaded-condition buffer 104. The loaded-condition Monitoring Department 106 which acquired the loaded condition of a server 506 memorizes the value of a load to the field of the name 701 of the server loaded-condition buffer 104, the name 703 which is a field other than the field of the load value 702, and the load value 704.
[0035] The format of the server loaded-condition buffer 104 in this case is the same as that of the gestalt 1 of operation, as shown in drawing 7 (a), the server names 701 and 703 and the load values 702 and 704 of the server are expressed, and the load values 702 and 704 of a server are expressed considering 100 as maximum. As for the combination of a server name and a load value, only the part of the number of servers exists.
[0036] In Time T, the flow control section 105 looks at the load values 702 and 704 of a server, and sends the packet taken out out of the preservation buffer 102 temporarily [demand] to the server 506 (name www2) which is a server with a small load value. And when time t Is drawing 7 (b) which passed, as for the load value of a server 502, the direction of (a name www1) sends the packet taken out out of the preservation buffer 102 towards the server 502 temporarily [demand] since it was small.
[0037] A server the packet of the sent demand The network physical layer of the network physical layer storing section 114, The network interface layer of the network interface layer storing section 113, It processes in order of the communications protocol of the communications protocol storing section 112, and the application of the application storing section 111. Turn contrary to the above, i.e., application of

the application storing section 111, A packet is sent in order of the communications protocol of the communications protocol storing section 112, the network interface layer of the network interface layer storing section 113, and the network physical layer of the network physical layer storing section 114, and a result is returned to the line concentration inverter 501. The line concentration inverter 501 which received the result sends a result to client equipment 504 or 505.

[0038] According to the gestalt of this operation, as mentioned above by saving temporarily the demand to the server from the client equipments 504 and 505, and having chosen the server with the smallest load among two or more sets of servers 502 and 506 Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and it becomes possible to return the result which receives all demands to the client equipments 504 and 505.

[0039] (Gestalt 3 of operation) Drawing 8 is the network-configuration view showing the network system by the gestalt 3 of operation of this invention. The client equipment by which the line concentration inverter by which 801 is equivalent to the line concentration inverter 101 of drawing 1 , and 802 are connected to the same network as the line concentration inverter 501 in drawing 8 , the server of the name www equivalent to the server 110 of drawing 1 and 803 are connected to the Internet, and 804 is connected to the Internet 803, and 805 are secondary storages connected to the line concentration inverter 801.

[0040] Drawing 9 is the data view showing the content of the cache in a secondary storage 805. In drawing 9 , the demand namelist where 901 saves the demand name from client equipment 804, and 902 are one demand name in the demand namelist 901.

[0041] The operation is explained about the network system constituted as mentioned above.

[0042] First, client equipment 804 presupposes that the demand, for example, "GETlab/techlab.htm", was performed to the server 802. After storing the line concentration inverter 801 in the demand namelist 901 by making the above-mentioned demand into the demand name 902 (storage step), and it sends it to a server 802 and it receives the result, it is returned to client equipment 804. Next, client equipment 804 presupposes that the same demand, i.e., "GETlab/techlab.htm", was performed to the server 802. Before the line concentration inverter 801 sends a demand to a server 802, it searches the inside of the demand namelist 901 and investigates whether there is any above-mentioned demand. Since there is the above-mentioned demand as a demand name 902, the line concentration inverter 801 returns the content of the cache which exists in a secondary storage 805 to client equipment 804 instead of sending out a demand to a server 802 (return step).

[0043] According to the gestalt of this operation, it is made to memorize in a secondary storage 805 as mentioned above by making into a cache the result returned to the 1st time from the server 802 to client equipment 804. By having returned the content of a cache to client equipment 804, when there was the same demand from client equipment 804 Since the storage capacity of a secondary storage 805 does not increase but the traffic on a network can be prevented from increasing if the demand from client equipment 804 is the same demand as last time Even if it is the case where a lot of demand comes from client equipment, a server can process all demands, without throwing away a demand, and it becomes possible to return the result which receives all demands to client equipment 804.

[0044]

[Effect of the Invention] According to the network system of this invention, as mentioned above by saving the demand to the server from client equipment temporarily, and adjusting the amount of drawing to the server of the packet of a demand according to loaded condition Since a server can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, the advantageous effect of becoming possible to return the result which receives all demands to a client is acquired.

[0045] The flow control section moreover, by taking out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen when two or more servers existed Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the

amount of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.

[0046] Furthermore, a line concentration inverter is made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment. By returning the content of a cache to client equipment, when there is the same demand from client equipment Since the storage capacity of a secondary storage does not increase but the traffic on a network can be prevented from increasing if the demand from client equipment is the same demand as last time Even if it is the case where a lot of demand comes from client equipment, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.

[0047] By according to the load adjustment method of this invention, saving the demand to the server from client equipment temporarily, and adjusting the amount of drawing to the server of the packet of a demand according to loaded condition Since a server can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, the advantageous effect of becoming possible to return the result which receives all demands to a client is acquired.

[0048] Moreover, by taking out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen in an adjustment step when two or more servers existed Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.

[0049] Furthermore, the storage step made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment, By having the return step which returns the content of a cache to client equipment when there is the same demand from client equipment Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the network system which consists of networks, such as a line concentration inverter, a server, client equipment, and a local area network, etc., and the load adjustment method of the network system.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] In recent years, in the network system which consists of networks, such as a line concentration inverter, a server, client equipment (equipment of a client side), a local area network, and a Wide Area Network, etc., a lot of demand arrives from the arbitrary client equipments in the world increasingly at once with the explosive spread of the Internet to what is called the server which offers specific service, especially Internet server.
[0003] The art of the server to the demand from the client equipment in the network system which consisted of conventional client equipment, servers, and line concentration inverters below, and the role of the above-mentioned line concentration inverter are explained. When the demand from client equipment arrived, the server performed processing according to the demand and had returned the result to client equipment. Usually, when the demand from client equipment came simultaneously and the server was to a certain amount of number (usually five), by buffering with the little buffer which exists in the server itself, it was able to be taken and spilt and was able to be processed that there is nothing. At this time, the line concentration inverter could not but be the inverter which changes the line concentrator of a mere circuit, and the connected protocol of the network of ends, or equipment which controls the path of data which comes and goes.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, according to the network system of this invention, the demand to the server from client equipment is saved temporarily, and the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition, Since a server can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, the advantageous effect of becoming possible to return the result which receives all demands to a client is acquired.
[0045] Moreover, the flow control section is taking out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen, when two or more servers' exist. Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server, even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect become possible to return the result which receives all demands to client equipment is acquired.
[0046] Furthermore, a line concentration inverter receives client equipment from a server at the 1st time. By returning the contents of a cache to client equipment, when it is made to memorize in a secondary storage by having made the returned result into the cache and there is the same demand from client equipment Since the storage capacity of a secondary storage does not increase but the traffic on a network can be prevented from increasing if the demand from client equipment is the same demand as last time Even if it is the case where a lot of demand comes from client equipment, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.
[0047] According to the load adjustment method of this invention, the demand to the server from client equipment is saved temporarily, and the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition, Since a server can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, the advantageous effect of becoming possible to return the result which receives all demands to a client is acquired.
[0048] Moreover, the thing to take out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen in an adjustment step when two or more servers existed, Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server, even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect become possible to return the result which receives all demands to client equipment is acquired.
[0049] Furthermore, let the result returned to the 1st time from the server to client equipment be a cache. By having the storage step made to memorize in a secondary storage, and the return step which returns the contents of a cache to client equipment when there is the same demand from client equipment Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount

of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and the advantageous effect of becoming possible to return the result which receives all demands to client equipment is acquired.

[Translation done.]

* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when six or more demands from client equipment came by the above-mentioned conventional network system simultaneously, the server had the trouble that any one demand had to be thrown away at least. Moreover, while performing processing whose server applies a very heavy burden to CPU or memory, when a demand came from client equipment, the result which receives the demand could not be easily returned to client equipment, but it had the trouble of becoming a time-out and throwing away after all.
[0005] By this network system and the load adjustment method, even if there is a lot of demand from client equipment, it is required that a demand should not be thrown away.
[0006] this invention aims at offering the load adjustment method for processing, when there is a lot of [simultaneous and] demand from the network system which can be processed even if there is a lot of [simultaneous and] demand from client equipment, and client equipment.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem] In order to solve this technical problem the network system of this invention A network, two or more client equipments on a network, and the server that gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client equipment and a server. a line concentration inverter Temporarily [demand] save the demand to the server from client equipment temporarily A preservation buffer, It has the composition which has the loaded-condition Monitoring Department which supervises the loaded condition of a server periodically, and the flow control section which adjusts the amount of drawing to the server of the packet of a demand according to the loaded condition which supervised at the loaded-condition Monitoring Department.
[0008] The network system which can be processed even if there is a lot of [simultaneous and] demand from client equipment by this is obtained.
[0009] The load adjustment method of this invention for solving this technical problem A network, two or more client equipments on a network, and the server that gives its service by receiving the demand from client equipment on a network, and returns the result to the aforementioned client equipment, Temporarily [demand] which it is [temporarily] the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and makes the demand to the server from client equipment save temporarily A preservation step, It has the composition which has the loaded-condition surveillance step which makes the loaded condition of a server supervise periodically, and the adjustment step which adjusts the amount of drawing to the server of the packet of a demand according to the supervised loaded condition.
[0010] The load adjustment method for processing, when there is a lot of [simultaneous and] demand from client equipment by this is acquired.
[0011]
[Embodiments of the Invention] The client equipment of the plurality [invention / according to claim 1 / of this invention] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client equipment and a server. a line concentration inverter Temporarily [demand] save the demand to the server from client equipment temporarily A preservation buffer, It is supposed that it has the loaded-condition Monitoring Department which supervises the loaded condition of a server periodically, and the flow control section which adjusts the amount of drawing to the server of the packet of a demand according to the loaded condition which supervised at the loaded-condition Monitoring Department. The demand to the server from client equipment is saved temporarily, and has operation that the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition.
[0012] In invention according to claim 1, the flow control section presupposes that invention according to claim 2 is taken out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen when two or more servers exist, and it has operation that a server with

the smallest load is chosen among two or more sets of servers.
[0013] The client equipment of the plurality [invention / according to claim 3] on a network and a network, The server which gives its service by receiving the demand from the aforementioned client equipment on a network, and returns the result to client equipment, It is the network system which has the line concentration inverter which intervenes between client equipment and a server, and the secondary storage connected to the line concentration inverter. a line concentration inverter It is made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment. It is supposed that it has the flow control section which returns the contents of a cache to client equipment when there is the same demand from client equipment. If the demand from client equipment is the same demand as last time, the storage capacity of a secondary storage has operation that do not increase and the traffic on a network does not increase.
[0014] The client equipment of the plurality [invention / according to claim 4] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to the aforementioned client equipment, Temporarily [demand] which it is [temporarily] the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and makes the demand to the server from client equipment save temporarily A preservation step, It is supposed that it has the loaded-condition surveillance step which makes the loaded condition of a server supervise periodically, and the adjustment step which adjusts the amount of drawing to the server of the packet of a demand according to the supervised loaded condition. The demand to the server from client equipment is saved temporarily, and has operation that the amount of drawing to the server of the packet of a demand is adjusted according to loaded condition.
[0015] In invention according to claim 4, in an adjustment step, when two or more servers exist, invention according to claim 5 decides to take out to the server which the server with the smallest load was chosen [server] and had the packet of a demand chosen, and has operation that a server with the smallest load is chosen among two or more sets of servers.
[0016] The client equipment of the plurality [invention / according to claim 6] on a network and a network, The server which gives its service by receiving the demand from client equipment on a network, and returns the result to client equipment, It is the load adjustment method of a network system of having the line concentration inverter which intervenes between client equipment and a server, and the secondary storage connected to the line concentration inverter. The storage step made to memorize in a secondary storage by making into a cache the result returned to the 1st time from the server to client equipment, It is supposed that it has the return step which returns the contents of a cache to client equipment when there is the same demand from client equipment. If the demand from client equipment is the same demand as last time, the storage capacity of a secondary storage has operation that do not increase and the traffic on a network does not increase.
[0017] Hereafter, the form of operation of this invention is explained using drawing 1 - drawing 9 . (Form 1 of operation) Drawing 1 is the block diagram showing the line concentration inverter and server which constitute the network system by the form 1 of operation of this invention. The line concentration inverter to which 101 connects local area networks or Wide Area Networks in drawing 1 , 102 temporarily [demand] for the line concentration inverter 101 saving temporarily the demand to the server (it mentioning later) 110 from client equipment A preservation buffer, The server interface section required in order that, as for 103, the loaded-condition Monitoring Department (it mentions later) 106 in the line concentration inverter 101 may investigate the loaded condition of a server 110, The server loaded-condition buffer with which 104 memorizes the loaded condition of a server 110, The flow control section which 105 adjusts the amount required to a server 110, and performs a flow control, The loaded-condition Monitoring Department where 106 supervises the state of the load of a server 110, the routing processing section in which 107 manages routing of a packet, The network interface layer storing section which stores the network interface layer in which agency of the routing processing section 107 and a physical interface is performed 108, The network physical layer storing section which stores the network physical layer in which 109 manages the electrical property of a network, The server

which exists on the network as the line concentration inverter 101 where 110 is the same, The application storing section which stores the application with which 111 offers specific service to client equipment, The communications protocol storing section for which 112 depended on the above-mentioned application, the network interface layer storing section which stores the network interface layer in which 113 performs agency of the above-mentioned communications protocol and a physical interface, The network physical layer in which 114 manages the electrical property of a network, and 115 are Wide Area Networks, such as a local area network or the Internet, such as an enterprise network, and an ISDN network.

[0018] Drawing 2 is the network-configuration view showing the network system by the form 1 of operation of this invention. They are the Internet and client equipment by which the line concentration inverter by which 201 is equivalent to the line concentration inverter 101 of drawing 1 , the server of the name WWW with which 202 is equivalent to the server 110 of drawing 1 , and 203 are connected to 204 in drawing 2 , and 205 are connected to the Internet 203.

[0019] Drawing 3 is the data view showing the contents of the preservation buffer 102 (refer to drawing 1) temporarily [demand] exists in the line concentration inverter 201. As for 301 and 304, in drawing 3 , the demand from client equipment 204, and 302, 303 and 305 are the demands from client equipment 205.

[0020] Drawing 4 (a) and (b) are the loaded-condition views showing the state of the server loaded-condition buffer 104 (refer to drawing 1) in a certain time, drawing 4 (a) shows the state of the server loaded-condition buffer 104 in Time T, and drawing 4 (b) shows the state of the server loaded-condition buffer 104 in time T+t. As for 401 and 403, in drawing 4 , a server name, and 402 and 404 are load values.

[0021] The operation is explained about the network system constituted as mentioned above.

[0022] First, client equipment 204 carries out [having required from the server 202, and]. The line concentration inverter 201 receives the packet of the above-mentioned demand in order of the network physical layer of the network physical layer storing section 109, the network interface layer of the network interface layer storing section 108, and the routing processing section 107, passes it to the flow control section 105, and is saved at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Next, client equipment 205 carries out [having required from the server 202, and]. The line concentration inverter 201 saves a demand similarly at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Again, a client 204 carries out [having required from the server 202, and]. The line concentration inverter 201 saves the above-mentioned demand at the preservation buffer 102 temporarily [demand] (demand one time preservation step).

[0023] When the above mentioned is repeated, the demands 301-305 as shown in drawing 3 will be memorized in an order from a top in the preservation buffer 102 temporarily [demand]. The line concentration inverter 201 supervises the loaded condition of a server 202 periodically by the server interface section 103 at the loaded-condition Monitoring Department 106, performing the above operation (loaded-condition surveillance step). The loaded-condition Monitoring Department 106 which acquired the loaded condition of a server 202 memorizes the value of a load to the server loaded-condition buffer 104. The format of the server loaded-condition buffer 104 expresses the server name 401 and the load value 402 of the server, as shown in drawing 4 (a), and the load value 402 of a server is expressed considering 100 as maximum.

[0024] The flow control section 105 looks at the load value 402 of a server, and, in the case of the value more than a certain constant value (for example, 70), the speed which takes out the packet of a demand from the preservation buffer 102 temporarily [demand] is loosened (adjustment step). At the time T of drawing 4 (a), since a load value is 34, it judges with the flow control section 105 having a margin in a server 202, as many packets as possible are taken out from the preservation buffer 102 temporarily [demand], and it sends to a server 202 (adjustment step). The state time t Where it has passed from this state is shown in drawing 4 (b). In the state which shows in drawing 4 (b), the load value is increasing to 89. It judges with the flow control section 105 not having CPU or memory which fully manages processing in a server 202, the speed which takes out a packet from the preservation buffer 102

temporarily [demand] is loosened (adjustment step), and it waits for the load value of a server 202 to fall again.
[0025] A server 202 the packet of the sent demand The network physical layer of the network physical layer storing section 114, The network interface layer of the network interface layer storing section 113, It processes in order of the communications protocol of the communications protocol storing section 112, and the application of the application storing section 111. Turn contrary to the above, i.e., application of the application storing section 111, A packet is sent in order of the communications protocol of the communications protocol storing section 112, the network interface layer of the network interface layer storing section 113, and the network physical layer of the network physical layer storing section 114, and a result is returned to the line concentration inverter 201.
[0026] The line concentration inverter 201 which received the result sends a result to client equipment 204 or 205.
[0027] According to the form of this operation, as mentioned above by saving temporarily the demand to the server from the client equipments 204 and 205, and having adjusted the amount of drawing to the server of the packet of a demand according to loaded condition Since a server 202 can process all demands, without throwing away a demand even if it is the case where a lot of demand comes simultaneously from two or more client equipments, it becomes possible to return the result which receives all demands to the client equipments 204 and 205.
[0028] (Form 2 of operation) Drawing 5 is the network-configuration view showing the network system by the form 2 of operation of this invention. They are the Internet and client equipment by which the line concentration inverter by which 501 is equivalent to the line concentration inverter 101 of drawing 1 , and 502 and 506 are connected to the same network as the line concentration inverter 501 in drawing 5 , the server of the names www1 and www2 equivalent to the server 110 of drawing 1 and 503 are connected to 504, and 505 are connected to the Internet 503.
[0029] Drawing 6 is the data view showing the contents of the preservation buffer 102 (refer to drawing 1) temporarily [demand] exists in the line concentration inverter 501. As for 601 and 604, in drawing 6 , the demand from client equipment 504, and 602, 603 and 605 are the demands from client equipment 505.
[0030] Drawing 7 (a) and (b) are the loaded-condition views showing the state of the server loaded-condition buffer 104 (refer to drawing 1) in a certain time, drawing 7 (a) shows the state of the server loaded-condition buffer 104 in Time T, and drawing 7 (b) shows the state of the server loaded-condition buffer 104 in time T+t. As for 701, 703, 705, and 707, in drawing 7 , a server name, and 702, 704, 706 and 708 are burdens.
[0031] The operation is explained about the network system constituted as mentioned above.
[0032] First, client equipment 504 carries out [having required from the server, and]. In this case, client equipment 504 does not specify which server of servers 502 and 506 (names www1 and www2) it is. Two servers 505 and 506 are because the same service is offered. The line concentration inverter 501 saves the packet of the above-mentioned demand through the flow control section 105 like the gestalt 1 of operation at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Next, client equipment 505 carries out [having required from the server, and]. The line concentration inverter 501 saves a demand similarly at the preservation buffer 102 temporarily [demand] (demand one time preservation step). Again, a client 504 carries out [having required from the server 202, and]. The line concentration inverter 501 saves the above-mentioned demand at the preservation buffer 102 temporarily [demand] (demand one time preservation step).
[0033] When the above mentioned is repeated, the demands 601-605 as shown in drawing 6 will be memorized in an order from a top in the preservation buffer 102 temporarily [demand]. The line concentration inverter 501 supervises periodically the loaded condition of two servers 505 and 506 (names www1 and www2) by the server interface section 103 at the loaded-condition Monitoring Department 106, performing the above operation (loaded-condition surveillance step).
[0034] The loaded-condition Monitoring Department 106 which acquired the loaded condition of a server 502 memorizes the value of a load to the server loaded-condition buffer 104. The loaded-

condition Monitoring Department 106 which acquired the loaded condition of a server 506 memorizes the value of a load to the field of the name 701 of the server loaded-condition buffer 104, the name 703 which is a field other than the field of the load value 702, and the load value 704.
[0035] The format of the server loaded-condition buffer 104 in this case is the same as that of the gestalt 1 of operation, as shown in drawing 7 (a), the server names 701 and 703 and the load values 702 and 704 of the server are expressed, and the load values 702 and 704 of a server are expressed considering 100 as maximum. As for the combination of a server name and a load value, only the part of the number of servers exists.
[0036] In Time T, the flow control section 105 looks at the load values 702 and 704 of a server, and sends the packet taken out out of the preservation buffer 102 temporarily [demand] to the server 506 (name www2) which is a server with a small load value. And when time t Is drawing 7 (b) which passed, as for the load value of a server 502, the direction of (a name www1) sends the packet taken out out of the preservation buffer 102 towards the server 502 temporarily [demand] since it was small.
[0037] A server the packet of the sent demand The network physical layer of the network physical layer storing section 114, The network interface layer of the network interface layer storing section 113, It processes in order of the communications protocol of the communications protocol storing section 112, and the application of the application storing section 111. Turn contrary to the above, i.e., application of the application storing section 111, A packet is sent in order of the communications protocol of the communications protocol storing section 112, the network interface layer of the network interface layer storing section 113, and the network physical layer of the network physical layer storing section 114, and a result is returned to the line concentration inverter 501. The line concentration inverter 501 which received the result sends a result to client equipment 504 or 505.
[0038] According to the gestalt of this operation, as mentioned above by saving temporarily the demand to the server from the client equipments 504 and 505, and having chosen the server with the smallest load among two or more sets of servers 502 and 506 Since it can prevent that the load of only one server becomes heavy while adjusting appropriately the amount of the demand sent to a server Even if it is the case where a lot of demand comes simultaneously from two or more client equipments, a server can process all demands, without throwing away a demand, and it becomes possible to return the result which receives all demands to the client equipments 504 and 505.
[0039] (Gestalt 3 of operation) Drawing 8 is the network-configuration view showing the network system by the gestalt 3 of operation of this invention. The client equipment by which the line concentration inverter by which 801 is equivalent to the line concentration inverter 101 of drawing 1 , and 802 are connected to the same network as the line concentration inverter 501 in drawing 8 , the server of the name www equivalent to the server 110 of drawing 1 and 803 are connected to the Internet, and 804 is connected to the Internet 803, and 805 are secondary storages connected to the line concentration inverter 801.
[0040] Drawing 9 is the data view showing the content of the cache in a secondary storage 805. In drawing 9 , the demand namelist where 901 saves the demand name from client equipment 804, and 902 are one demand name in the demand namelist 901.
[0041] The operation is explained about the network system constituted as mentioned above.
[0042] First, client equipment 804 presupposes that the demand, for example, "GETlab/techlab.htm", was performed to the server 802. After storing the line concentration inverter 801 in the demand namelist 901 by making the above-mentioned demand into the demand name 902 (storage step), and it sends it to a server 802 and it receives the result, it is returned to client equipment 804. Next, client equipment 804 presupposes that the same demand, i.e., "GETlab/techlab.htm", was performed to the server 802. Before the line concentration inverter 801 sends a demand to a server 802, it searches the inside of the demand namelist 901 and investigates whether there is any above-mentioned demand. Since there is the above-mentioned demand as a demand name 902, the line concentration inverter 801 returns the content of the cache which exists in a secondary storage 805 to client equipment 804 instead of sending out a demand to a server 802 (return step).
[0043] According to the gestalt of this operation, it is made to memorize in a secondary storage 805 as

mentioned above by making into a cache the result returned to the 1st time from the server 802 to client equipment 804. By having returned the content of a cache to client equipment 804, when there was the same demand from client equipment 804 Since the storage capacity of a secondary storage 805 does not increase but the traffic on a network can be prevented from increasing if the demand from client equipment 804 is the same demand as last time Even if it is the case where a lot of demand comes from client equipment, a server can process all demands, without throwing away a demand, and it becomes possible to return the result which receives all demands to client equipment 804.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

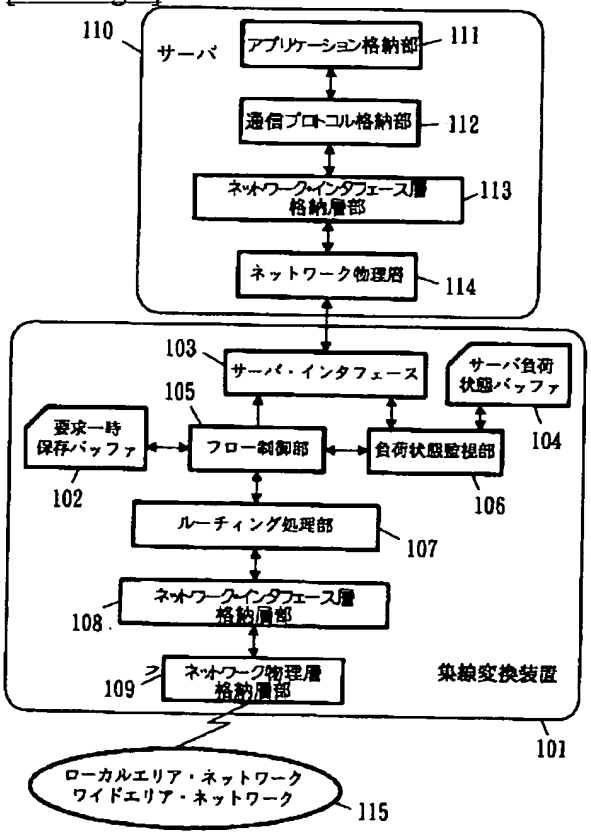
[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the line concentration inverter and server which constitute the network system by the gestalt 1 of operation of this invention
[Drawing 2] The network-configuration view showing the network system by the gestalt 1 of operation of this invention
[Drawing 3] The data view showing the content of a preservation buffer temporarily [demand] exists in a line concentration inverter
[Drawing 4] (a) The loaded-condition view showing the state of the server loaded-condition buffer in a certain time
(b) The loaded-condition view showing the state of the server loaded-condition buffer in a certain time
[Drawing 5] The network-configuration view showing the network system by the gestalt 2 of operation of this invention
[Drawing 6] The data view showing the content of a preservation buffer temporarily [demand] exists in a line concentration inverter
[Drawing 7] (a) The loaded-condition view showing the state of the server loaded-condition buffer in a certain time
(b) The loaded-condition view showing the state of the server loaded-condition buffer in a certain time
[Drawing 8] The network-configuration view showing the network system by the gestalt 3 of operation of this invention
[Drawing 9] The data view showing the content of the cache in a secondary storage
[Description of Notations]
101, 201, 501, 801 Line concentration inverter
102 Demand One Time Preservation Buffer
103 Server Interface Section
104 Server Loaded-Condition Buffer
105 Flow Control Section
106 Loaded-Condition Monitoring Department
107 Routing Processing Section
108 113 Network interface layer storing section
109 114 Network physical layer storing section
110, 202, 502, 506, 802 Server
111 Application Storing Section
112 Communications Protocol Storing Section
115 Local Area Network (Wide Area Network)
203, 503, 803 Internet
204, 205, 504, 505, 804 Client equipment
805 Secondary Storage

[Translation done.]

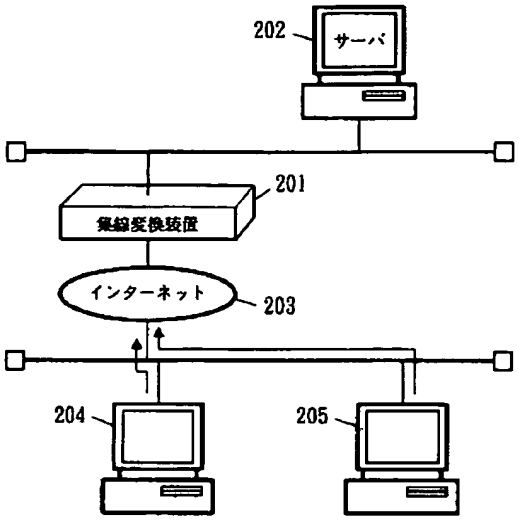
* NOTICES *

DRAWINGS

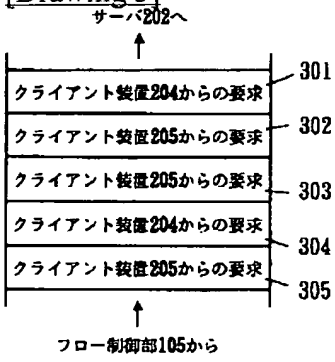
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

(a)

サーバ名称	負荷値
www	34／100

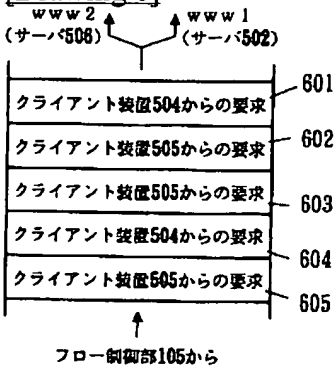
401 402

(b)

サーバ名称	負荷値
www	89／100

403 404

[Drawing 6]



[Drawing 7]

(a)

サーバ名称	負荷値
www1	89／100
www2	56／100

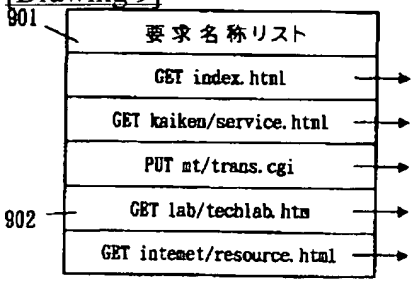
701 702 703 704

(b)

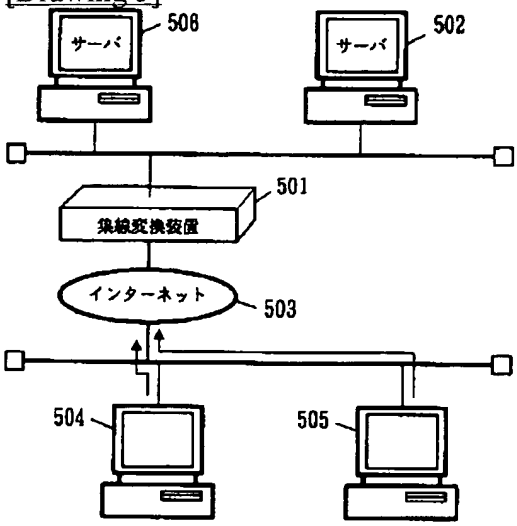
サーバ名称	負荷値
www1	23／100
www2	45／100

705 706 707 708

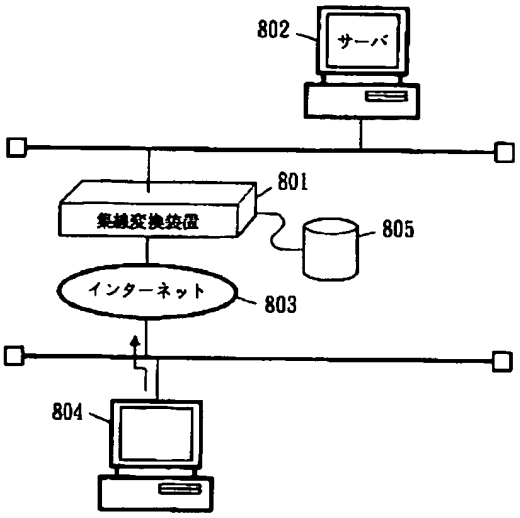
[Drawing 9]



[Drawing 5]



[Drawing 8]



[Translation done.]